



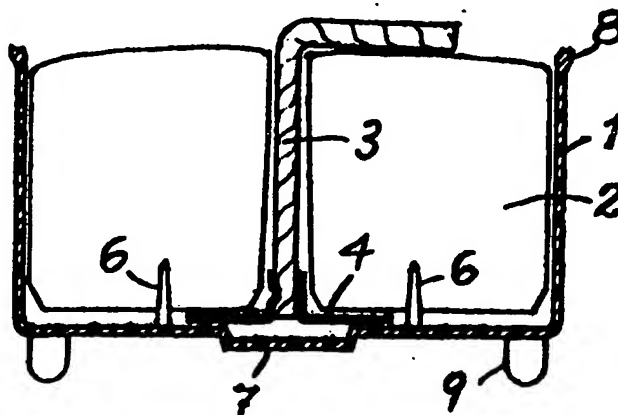
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/SE95/01598 (22) International Filing Date: 29 December 1995 (29.12.95) (30) Priority Data: 9404560-6 29 December 1994 (29.12.94) SE (71) Applicant (for all designated States except US): ARCHITECTURAL STRUCTURES INC. [US/US]; 505 Park Avenue, New York, NY 10022 (US). (72) Inventor; and (75) Inventor/Applicant (for US only): JOHANSON, Lars-Gunnar [SE/SE]; Birkagatan 6 (2 tr), S-113 36 Stockholm (SE). (74) Common Representative: JOHANSON, Lars-Gunnar; Birkagatan 6 (2 tr), S-113 36 Stockholm (SE).	(81) Designated States: CA, FI, NO, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Swedish).</i>	

(54) Title: SAFETY CUP FOR PARAFFIN CANDLE

(57) Abstract

A safety cup for candles made of a transparent, halogen free, opaque or coloured polymer material, with a jacket (1) having a cylindrical surface of revolution with one into it fitting candle mass of compressed paraffin granulate (2), traversed by a candle wick (3) connected to a metal plate (4), which is located between the candle mass and the bottom of the candle cup. The candle cup is on its inside provided with thin pins (6), protruding from the bottom, which, when the candle mass is pressed into the candle cup, penetrates the candle mass without cracking it and also axially locates the candle mass in the cup, thereby retaining the candle mass inside the cup and, when the candle mass has become liquid, radially locates the metal plate (4) to the center of the candle cup. The pins (6) can be hooked or dented to facilitate engaging the metal plate (4). The bottom of the cup has a depressed area (7) for keeping a metal plate (4), incidentally having a stump (5) of the wick protruding from its underside, in horizontal position after the candle mass has become liquid. The candle cup is provided with a handgrip (8) on its outer top edge, enabling the user to handle the candle with its wick (3) kept localized in the center of the cup. The underside of the cup is provided with distance organs (9), permitting free placement of the candle. The distance organs constitute guides for stacking of the candles.



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TITLE: SAFETY CUP FOR PARAFFIN CANDLE.

5

This invention relates to a safety design of a cup for candles, consisting of a burning mass of compressed paraffin granulate, also called "tealight". The cup is made of an injection moulded polymer material, which through a number of cooperating features in combination with the properties of the material, minimizes the risk for increased temperatures and heat radiation during the whole burning cycle and also secures optimal light intensity.

Background of the invention

15 The invention is related to the use of common tealights having the following design characteristics:

These candles were originally intended as a heating source for different temperature holding devices for food and drink, but nowadays are mainly use for decorative purposes in lanterns etc. These so-called tealights are equipped with a cup of aluminium consisting of a circular cup with a flat bottom, in which is fitted a cylindrical mass, centrally traversed by a candle wick, which in its lower end is connected to a cylindrical metal plate, located between the underside of the candle mass and the bottom of the cup. The cup is made of very thin aluminium strip, and in the center of its bottom there is a depression with a depth of about 0,5 mm, serving as a location for the metal plate holding the wick; there are also some circular depressed bosses in the bottom, extending about 1 mm from the underside of the cup and serving as supporting feet for the cup. There are other models having an embossed narrow rim on the outer periphery of the cup's bottom, which means that there is a direkt contact with the supporting surface, with zero distance.

When the candle mass has become liquid after about one hour burning time, there is a risk that the metal plate of the wick and then also the flame itself will be dislocated from its central position in the cup, despite its depressed seat in the bottom of the cup. The metal plate also on its underside is provided with small depressed feet, which are lifting it up from the bottom, thus partly elimina-

ting the effect of the depressed area at the bottom of the cup. This contributes to the fact that the metal plate including the wick and its flame easily can slide out of the depression and touch the side-wall of the cup, which may lead to local overheating of the wall, bringing it to a very high temperature, which may lead to an overall burning of the candle mass, a so-called overblow, with flames up to two or three decimeters high with accompanying development of smoke. This may cause damage to surrounding materials. The main reason for the great increase in temperature is the high heat absorption and heat radiation of the aluminium. Occasional overblow generally takes place late in the burning cycle, when the temperature of the burning paraffin reaches 400-600°C, according to a test report prepared by the Institute of Technology of Lund, Sweden. Altogether this makes the use of tealights having aluminium cups far from safe and those lights are definitely unsuited for decorative purposes. This motivated a new thinking about the design of candlecups from a safety point of view, also including optimizing the intensity of light. The problems with dislocation of the wick and overblow in free-burning tealights, and the use of tealights in candle lanterns, have been extensively described in reports from several meetings in the period of 1986 - 1991 of the Government's Consumer's office and various manufacturers and marketing companies, also including warning text for tealights. Based on these investigations the Consumer's office has initiated a "Test of tealights and candle lanterns", which has been carried through by the Institute of Fire Prevention Technology at the Institute of Technology of Lund, in cooperation with the Government's testing and research laboratory, Borås, Sweden. The final report is dated 15 June, 1989. This report emphasizes properties and problems concerning paraffin, tealights with aluminium cups and candle wicks, even when lighted without candle lanterns. Concerning the properties of paraffin it is found that its general density is in the interval of 730 - 790 kg/m³, melting temperature is 55 - 56°C, the flame point is 240°C, which makes obvious the risk for overblow, burning time for a tealight is 4 - 4.5 hours and the average temperature of a liquid paraffin mass is 90 - 120°C. Further, the report states, under the title "Tealights", (quotation): "Test have been made of 14 different tealights. Different makes and different products of the same brand have been tested. Generally it has been found that problems with the

wicks are common. These may move during the burning cycle and may turn over and be drowned in the molten mass, and then the flame will go out. It has also been established that an overflow in the candle mass can take place when the candle is lighted without a surrounding lantern". The Consumer's office is also exhorting the manufacturers (quotation): "to produce a safer design than the present tealights" and also points out that (quotation): "there is no tealight model on the market showing a satisfactory solution to the problem of wick location". The office looks forward to further improvements and adds (quotation): "from the consumer's point of view it would be simpler and better if one could find a candle which could be used without risk, even in the rather unsuitable lanterns existing in the households today". Marginally the office states that tealights is a low margin product leaving small means for product development. The Consumer's office comments the report saying that (quotation): "as the paraffin mass can be lighted also when its is free burning, the ambitions should be to improve the design of the tealights". A summary of the tests and evaluations of tested tealights can be found in "General Instructions for the use of tealights", recommended by The Consumer's office, and used by manufacturers, as follows:

1. Never leave a burning light unattended,
2. Do not move a burning tealight when liquid, the wick may change position and the candle may overflow,
3. Never place a tealight directly on a perishable surface or close to an inflammable object,
- 4 Do not extinguish the light by blowing, towards the end of the burning cycle, as there is a risk that the flame may overflow,
5. In case of overflow, choke the flame, do not use water,
6. Only use well ventilated candle lanterns,
7. Do not put several tealights close together,
8. See to it that there are no matches or other objects in the candle cup.

The present invention is mainly concerned with points 2 - 4.

PURPOSE AND CHARACTERISTICS OF THE INVENTION

Referring to the abovementioned problems and the risks related to the use of so-called tealights, the purpose of this invention is show how it is possible to create a safety light for decorative pur-

poses using a polymer material, with its inherent properties and design possibilities, provided with a candle mass of compressed paraffin granulate, at a competitive cost level, having the following characteristics:

5 Using a freely mouldable, transparent, opaque or coloured, halogen free, flame retardant polymer material with low heat absorption and heat radiation, formed as a preferably circular cup with from the bottom of the cup axially extending pins for safe radial location, to the centre of the cup, of the metal plate and a wick secured to it,
10 during the whole burning cycle, excluding dislocation of the flame with accompanying risk of so-called overblow. Thereby said candle can be used with a considerably improved safety factor, compared with known candles equipped with aluminium cups, where the metal plate holding the wick can easily change its radial position.

15 Said pins also have a double function in that they axially localize the paraffin mass in the cup. When the paraffin, with the aid of mechanical pressure, is placed into cup the pins will penetrate the relatively fragile paraffin mass without cracking it. The cup of this design will fit the manufacturers' standard shape of paraffin mass
20 with a flat underside without any recesses.

For horizontal fitting of the metal plate holding the wick, the bottom of the cup is provided with a minor depression centrally of the pins, so that even if the wick protrudes on the underside of the plate, which is a common problem, there will still be sufficient
25 space for the plate. Thus the wick will be axially localized at the center of cup in a vertical position.

Furthermore, on the upper side of the cup's outer wall there is a radially extending flange, constituting a manual grip for handling of the candle during the whole burning cycle, without risk for dislocation of the wick.
30

The low heat absorption and heat radiation of the polymer material is taken advantage of by equipping the underside of the cup with distance organs of the dimensions required for avoiding heat radiation to the cup's supporting surface, which makes it possible to
35 place the lights freely with no need for supporting lanterns.

As distinguished from tealights with aluminium cups the transparent construction material will give an optimal intensity of light in all directions, inclusive of transparent colourings, and from en-

vironmental point of view it is free from halogens and also has a caloric value when burning in a garbage incineration kiln, where it is converted to carbon dioxide and water.

The cup can carry text i relief or printed. In any case the invention will be better understood with the aid of the enclosed drawing and the following description, from which the advantages of the invention can be appreciated. All drawings are in scale 2:1.

Fig. 1 is a vertical section view showing the cup 1, the paraffin mass 2, the wick 3, the metal plate 4, the pins 6, the depression 7, the flange 8 and the distance organs 9,

Fig. 2 is a side view of the metal plate 4 with a wick stump 5,

Fig. 3 is a side view of the cup 1,

Fig. 4 is a plan view of the cup 1,

Fig. 5 is a plan view of the underside of the cup 1,

Fig. 6 is a perspective view of the cup 1, seen from above,

Fig. 7 is a perspective view of the cup 1, seen from the underside,

Fig. 8 is a plan view of a multicornered cup 11, seen from the underside

Fig. 9 is a plan view of a pleated cup 10, seen from the underside,

Fig. 10 is a perspective view of a stackable package 12.

DESCRIPTION OF AN EMBODIMENT

The drawings show a tealight cup with a flat bottom and a cylindrical jacket surface of revolution 1, which can be polygonal 11 or pleated 10. The cup is made by injection moulding, which is a prerequisite for the forming of a flameproof halogen free polymer material having low heat absorption, which may be transparent, opaque or coloured. Inside the cup, centrally positioned on its bottom, there is a number of thin, axially protruding pins 6 which, when the paraffin mass has become liquid, localize the metal plate 4 and with it the wick 3 and the flame, to the center of the cup, a fact of crucial importance for safety.

Inside the cup is placed a cylindrical candle mass consisting of compressed paraffin granulate with flat bottom 2. The candle mass has a central cavity through which is passed a candle wick 3 which, at its bottom end, is connected to a cylindrical metal plate 4, positioned between the candle mass and the bottom of the cup. The candle mass is pressed down through mechanical pressure, and the axially

protruding pins 6 on the bottom of the cup will penetrate the paraffin without cracking it, thus in fully inserted position axially locating the paraffin mass in the cup, which is a prerequisite for automatic production, since this will prevent the candle mass from
5 sliding out of the cup. The number of pins is 4 - 6, their diameter at the bottom end is 1 - 1.2 mm, they are tapered upwards and have a total length of 4 - 6 mm.

The candle wick is fixed at its lower end to a central collar of metal sheet 4, forming a foot for the wick. The waxed candle wick is
10 automatically cut off close to the underside of the metal plate, however this may cause problems, in that a stump of the wick may protrude sideways which, when the paraffin has become liquid, causes the wick to lean towards the side. For this reason the cup, inside the pins 6 axially protruding from the bottom, has a small circular depressed area, 1.0 - 1.5 mm deep in the bottom 7, to provide space for
15 these non-conformig metal plates, thus bringing them back into horizontal position in the cup with its wick 3 and the flame axially located, which is of importance for the safety of the design.

Due to the low heat absorption of the polymer material it is
20 possible to handle the candle cup manually during the whole of the burning cycle. For this reason the upper outer rim of the cup is shaped as a radially projekting flange, 1.0 - 1.5 mm wide, which can be used as a handgrip. On the contrary, a tealight with aluminium cup cannot be handled this way, because of its high temperature and the
25 risk of dislocating the wick in the cup. A tealight having an aluminium cup accumulates heat during the burning cycle, and the increasing temperature may cause damage to surrounding materials, whereas the temperature of a candle cup of polymer material will be comparatively lower, due to the polymer material's relatively lower heat
30 absorption and heat radiation. This effect is enhanced the cup's 1 distance organs 9, to the number of 3 - 6, protruding downwards from the underside of the cup to a distance of 2.5 - 4 mm, enabling the user to place the candle freely without a lantern etc., with no risk for damage to the supporting surface. The distance organs are de-
35 signed to fit inside the inner contour of the cup, thus permitting stacking of candles 12 in a package.

The polymer material is transparent or opaque or coloured, halogen free, flame retardant, made of polypropylene or polyamide with good heat resistance, low heat absorption and heat radiation.

5 The candle cup may carry text in relief or printed text on its underside.

10 The invention can be modified within the concept of the enclosed patent claims, by making the metal plate 4 engage the the pins 6, e. g. with a dented edge. The metal plate need not be circular, but can be polygonal. The pins 6 may be hooked or dented in order to engage the metal plate.

CLAIMS

1. Safety cup with a jacket (1) having a cylindrical surface of
5 revolution, alternatively a polygonal (11) or pleated (10) surface,
with flat horizontal bottom and one onto the bottom of the cup fit-
ting candle mass (2) of compressed paraffin granulate, in its middle
having a cavity traversed by a candlewick (3), which in its lower end
is connected to a metal plate (4), located between the underside of
10 the candle mass and the bottom of the cup.

characterized in that the cup is made of an injection
moulded polymer material having a number of circularly located, from
the bottom of the cup axially upwards protruding thin pins (6), which
after inserting the relatively fragile candle mass (2) onto the bot-
15 tom of the cup without cracking the candle mass, axially retain the
candle mass in the cup, and further, the candle mass having been li-
quid, radially locates the metal plate (4), which is loosely placed
on the bottom of the cup, to a central position in the cup, including
the candle wick (3) and the flame of the candle.

20 2. Candle cup as claimed in Claim 1,
characterized in that the axially protruding thin
pins (6), which are circularly located at the inside bottom of the
cup, also can be hooked or dented in order to engage the metal plate
(4) when the candle mass is pressed into the cup.

25 3. Candle cup as claimed in Claim 1 and 2,
characterized in that the cup is provided with a de-
vice for always keeping the metal plate (4) of the wick in horizontal
position when the candle mass has become liquid, thereby keeping the
wick (3) and the flame in axial position, consisting of a horizontal
30 depression (7) in the center of the cup, having a smaller diameter
than the metal plate (4) and of sufficient depth for leaving space
for metal plates incidentally having a protruding stump (5) of the
wick extending from the underside of the metal plate.

4. Candle cup as claimed in Claim 1 and 2,
35 characterized in that the cup on the outside part of
its top is provided with a handgrip consisting of a radially protru-
ding flange (8) which, due to the low heat absorption of the polymer
material, enables the user to handle the candle manually during the

whole of the burning cycle, maintaining the central location of the wick's supporting metal plate (4).

5 5. Candle cup as claimed in Claim 1 - 4,
c h a r a c t e r i z e d i n that the cup on its underside, ra-
dially along its peripheral outer edge, is provided with a number of
distance organs (9), sufficiently dimensioned to permit free posi-
tioning of the candles without damage to supporting surfaces, the
distance organs (9) also enabling stacking of the candle cup, thereby
acting as radial and axial guides.

10 6. Candle cup as claimed in Claim 1 - 5,
c h a r a c t e r i z e d i n that the polymer material preferably
is polypropylene or polyamide, which may be transparent, opaque or
coloured, and which is flame retardant with high heat resistance, and
low heat absorption and heat radiation.

15 7. Candle cup as claimed in Claim 1,
c h a r a c t e r i z e d i n that the candle cup (1) can carry
text in relief or printed text on its underside.

SUMMARY

A safety cup for candles made of a transparent, halogen free,
5 opaque or coloured polymer material, with a jacket (1) having a cylindrical surface of revolution with one into it fitting candle mass of compressed paraffin granulate (2), traversed by a candle wick (3) connected to a metal plate (4), which is located between the candle mass and the bottom of the candle cup.

10 The candle cup is on its inside provided with thin pins (6), protruding from the bottom, which, when the candle mass is pressed into the candle cup, penetrates the candle mass without cracking it and also axially locates the candle mass in the cup, thereby retaining the candle mass inside the cup and, when the candle mass has
15 become liquid, radially locates the metal plate (4) to the center of the candle cup.

The pins (6) can be hooked or dented to facilitate engaging the metal plate (4).

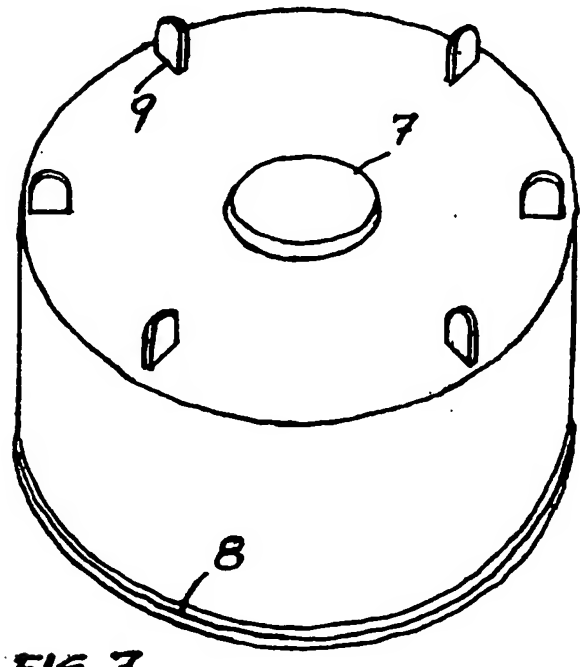
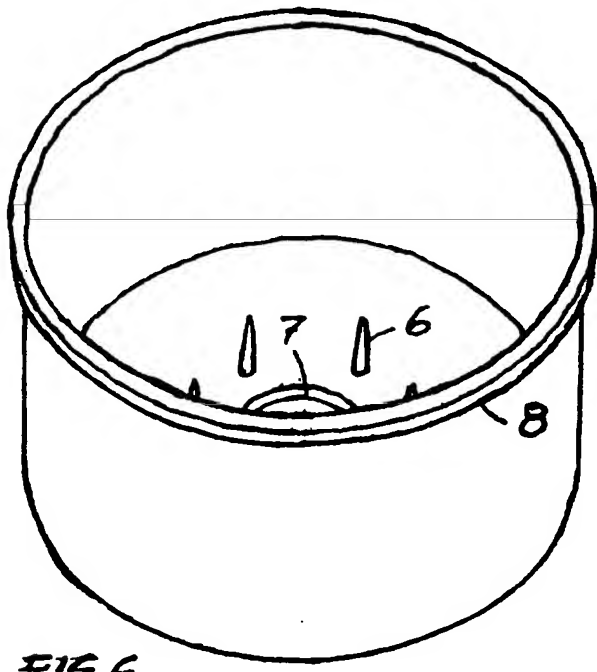
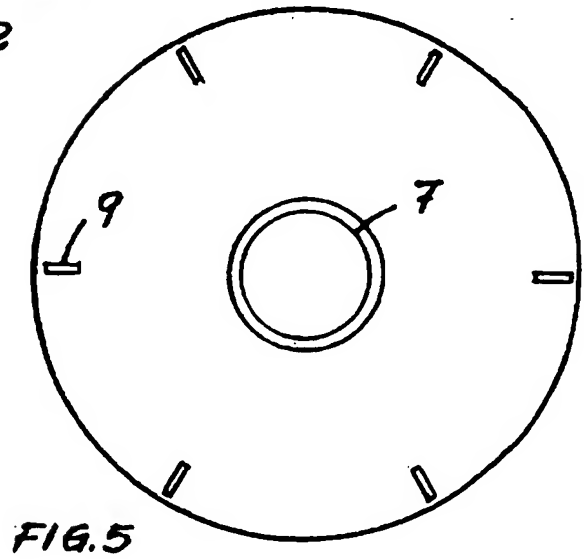
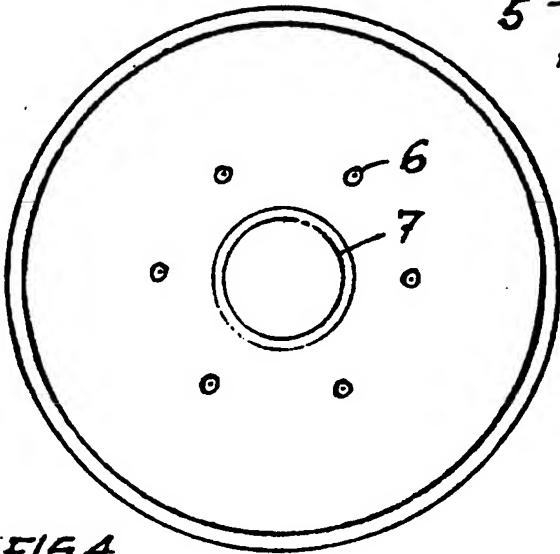
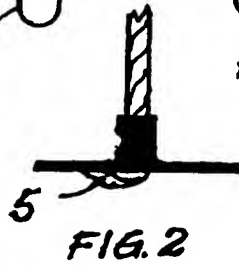
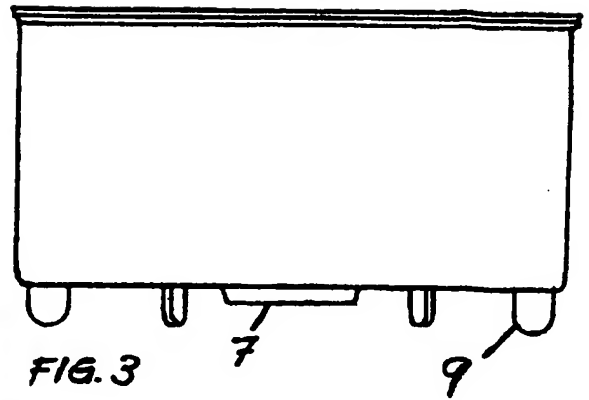
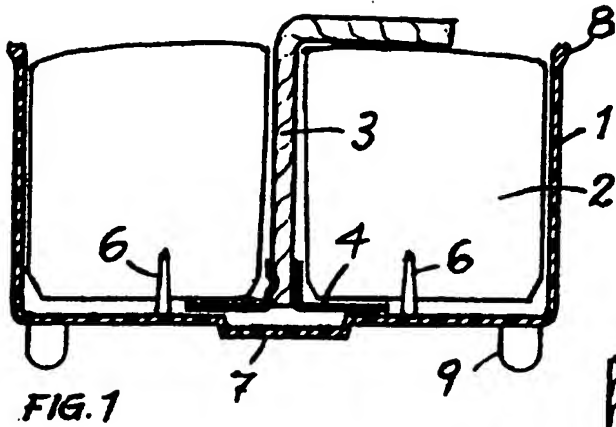
The bottom of the cup has a depressed area (7) for keeping a metal plate (4), incidentally having a stump (5) of the wick protruding
20 from its underside, in horizontal position after the candle mass having become liquid.

The candle cup is provided with a handgrip (8) on its outer top edge, enabling the user to handle the candle with its wick (3) kept
25 localized in the center of the cup.

The underside of the cup is provided with distance organs (9), permitting free placement of the candle.

The distance organs constitute guides for stacking of the candles.

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2/2

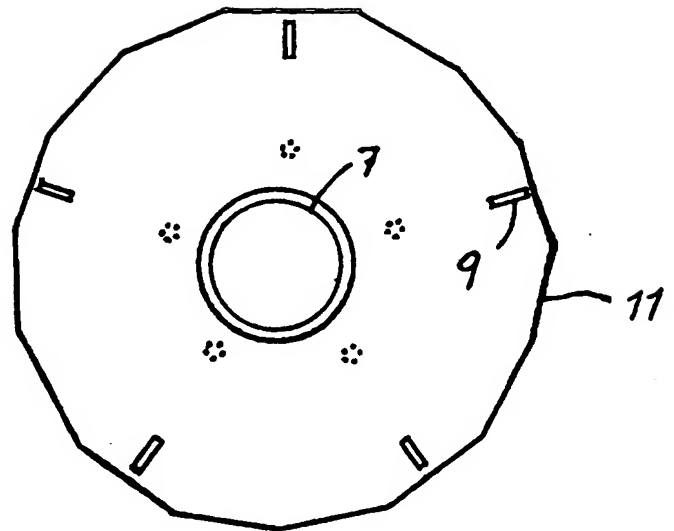


FIG. 8

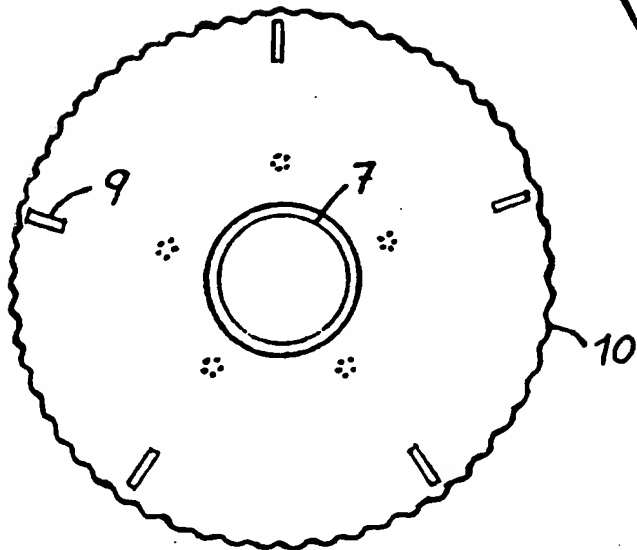


FIG. 9

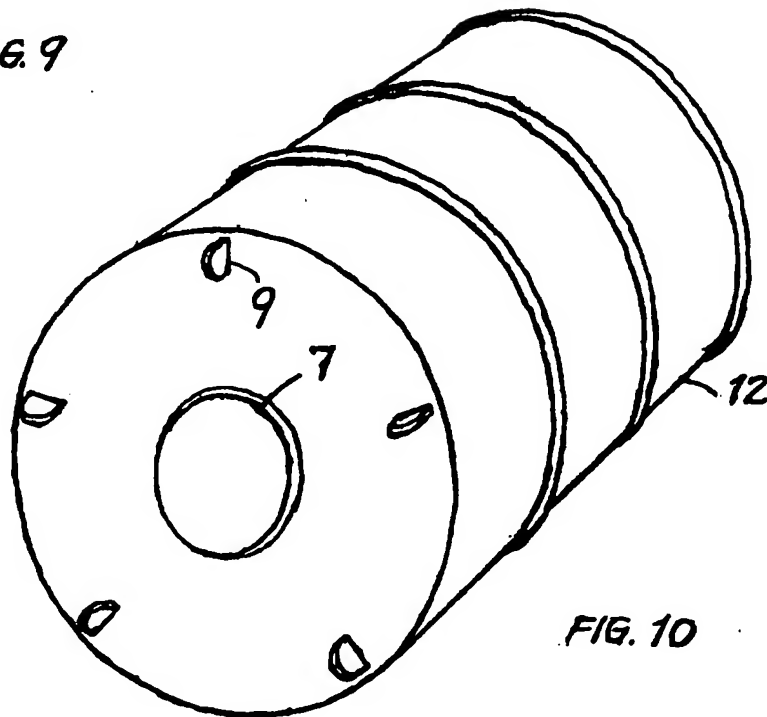


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 95/01598

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: F21V 35/00, C11C 5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: C11C, F21V

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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EPODOC, WPI, CLAIMS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2626961 A1 (KARL NETZER), 11 August 1989 (11.08.89), page 3, line 15 - page 4, line 9, figure 1 --	1-7
A	FR 491193 A (GERARD MATTMANN, BIENNE), 15 July 1970 (15.07.70), figure --	4,5
A	GB 2059434 A (AVON PRODUCTS INC.), 23 April 1981 (23.04.81), figure 2, abstract --	1-7
A	SE 441755 B (ARNE LUNDQUIST), 4 November 1985 (04.11.85), abstract -- -----	1-7



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See patent family annex.

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Date of mailing of the international search report

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Name and mailing address of the ISA:

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Eva Danielsson

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 95/01598

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A1- 2626961	11/08/89	DE-U- 8801661 DE-U- 8900813	24/03/88 27/04/89
FR-A- 491193	15/07/70	US-A- 1394075	00/00/00
GB-A- 2059434	23/04/81	DE-A,C,C 3036021 JP-C- 1587633 JP-B- 2004640 JP-A- 56103299 US-A- 4332548	23/04/81 19/11/90 29/01/90 18/08/81 01/06/82
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